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ORIGINAL ARTICLES.

MELANOMA OF THE IRIS, ADENOMA-LIKE TUMOR IN CILIARY BODY, AND ENORMOUS OSSIFICATION OF THE CHOROID IN AN EYE REMOVED ON ACCOUNT OF SYMPATHETIC IRRITATION OF ITS FELLOW.

By Adolf Alt, M.D.
ST. LOUIS, MO.

On March 15th, 1889, A. N., 25 years old, apparently a perfect specimen of healthy, vigorous manhood, consulted me on account of a gradual loss of vision in the right eye. I found in this eye V=only 10/200 in the upper temporal quadrant. Tn. The ophthalmoscope revealed several patches of whitish tissue protruding from the retina into the vitreous body. The largest one started from the temporal side of the optic papilla and measured about three disc diameters in length horizontally and was about one disc diameter broad. A few small blood-vessels could be detected within it. Several smaller patches surrounded this one. I took this to be a case of retinitis proliferans.

The patient did not return to me until October 14th, 1908. His right eye was now and had been for several years perfectly blind. There was no episcleral injection. The cornea was clear. The iris appeared somewhat discolored and its surface very uneven. In the lower inner quadrant near the ciliary margin a small dark brown spot of the size of a large pin head was visible. It protruded slightly over the neighboring tissue. The lens, which was shrunken and showed whitish patches of lime,

was dislocated downwards and very movable. Behind it in the free part of the pupil there was a grayish reflex. No ophthalmoscopic picture could now be obtained. The tension of the anterior part was somewhat below normal; but a little further back than the æquator the palpating finger could detect parts of

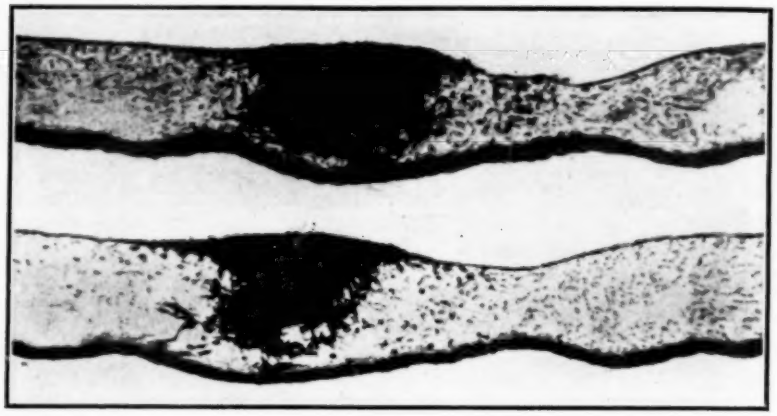

Fig. 1 and 2.

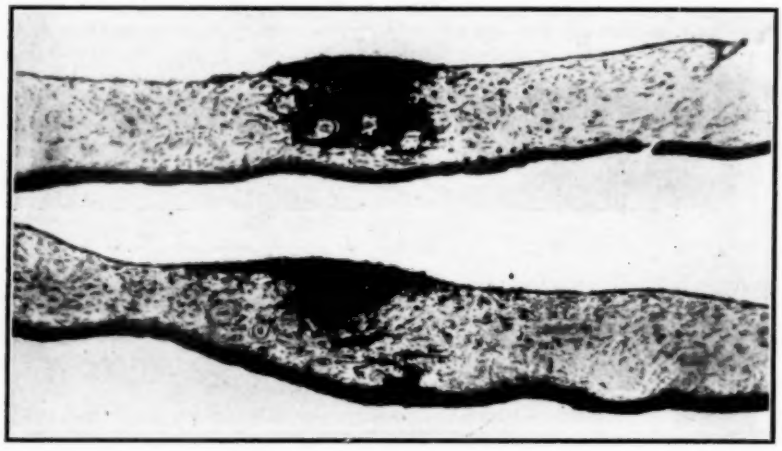

Fig. 3 and 4.

the sclera, which gave that peculiar resistance which usually denotes intraocular bone formation. As the patient complained of the inability to read longer than 15 to 20 minutes without pain and lacrimation in the otherwise healthy fellow eye, I advised the removal of the diseased right eye. At that time, however, the patient would not consent to this.

On January 26th, 1909, he returned, voluntarily asking to have the right eye removed. The operation and healing were without accident. The sympathetic irritation was at once greatly improved, but there was still some asthenopia in spite of the correcting glass when I saw him a month later. This has disappeared now.

The enucleated eyeball proved to be a perfect pathological museum.

When it was cut in two æquatorially, it was seen in the posterior half that at some time the retina had become detached

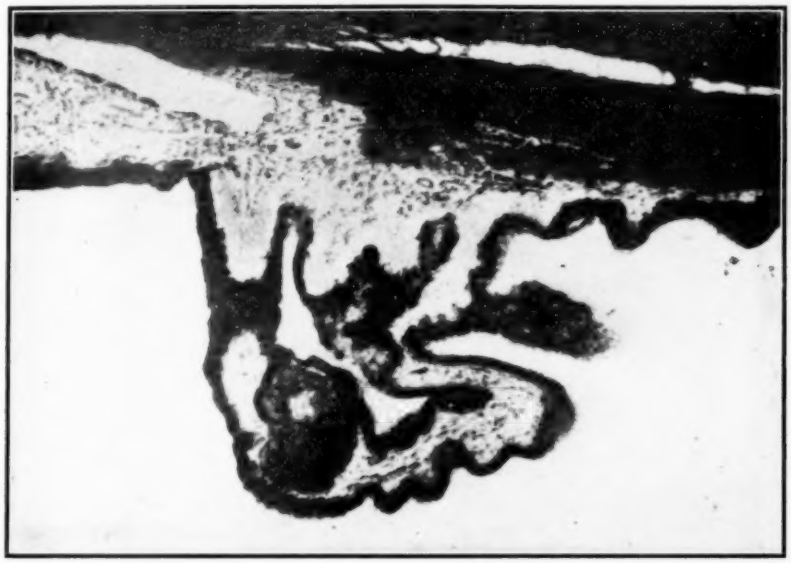

Fig. 5.

Adenoma-like tumor of a ciliary process, showing cavity filled with morphous material containing leucocytes.

from the optic nerve entrance, and that a thick bony shell, which lined the whole of this part of the eye, had grown across the former starting point of the retina at the disc. In fact, it was macroscopically impossible to find any tissue that looked like retina. In front of the thick bony shell there was a perfectly transparent, but tough, diaphragm with a central round opening stretched across the interior of the eye. The bone formation reached forward to and into a cyclitic mass which sprang from the region of the ora serrata. The crystalline lens was very much shrunken. No zonule of Zinn or any fibres of it could be

found. The shrunken lens was, however, attached to the lower part of the iris by a broad posterior synechia and it was thus prevented from falling down into the angle between the iris and the cyclitic membrane.

When I cut the eye in two a urine-like, yellowish, thin watery fluid escaped, which showed no histological elements; evidently degenerated vitreous body, probably tinged by blood pigment, as no remains of vitreous body could be found.

The most prominent feature, microscopically, was of course the enormous amount of osteoid and osseous tissue in this eye. While histologically full of interesting points, its minute descrip-

Fig. 6.
Ciliary growth enlarged.

tion would unnecessarily increase the size of this paper. Suffice it to state, that there are a number of layers of bone which, especially near the posterior pole, contain large cavities filled with bone marrow, which in some parts is densely infiltrated with round cells. The bone, in most sections, is situated on the inner surface of the atrophied and inflamed choroid and penetrates into this membrane here and there only. The transparent diaphragm mentioned above consists of osteoid tissue.

The structureless lens tissue contains a great deal of amorphous lime. No epithelial cells can be found. Where the lens

adheres to the iris, a large anterior polar cataract has at some time been formed. The lens capsule does not appear altered. There are no traces of any fibres of the suspensory ligament. The lens is simply held in place by the broad posterior synechia mentioned above.

The iris tissue in general shows a slight degree of atrophy. The anterior surface has a large number of crypts, some of which are very deep. There is a general slight infiltration with round cells among which plasma cells and eosinophiles are numerous, and, here and there, a distinct small focus of round cell infiltration. The walls of the bloodvessels are thickened and hyaline.

Fig. 7.
Section through solid part of ciliary growth. Bleached specimen.

Where macroscopically a brown spot was seen, the iris is slightly thickened, and the iris tissue is replaced by a very darkly pigmented tissue which slightly protrudes over the anterior surface. This black tissue does in no section quite reach the posterior surface of the iris. In the central part of the spot this tissue is so dense that its cellular elements cannot be distinguished. Several bloodvessels pass through it. It appears as if the cells composing it were the same as the chromatophores of the normal iris tissue. In bleached specimens, however, it is clear that the dark spot really consists of two parts. In the

anterior part the cells are very densely packed and lie together almost without any intervening connective tissue. They appear like spindle cells with their long axis parallel to the surface of the iris. This part reached backwards with a funnel-shaped outline. In the other part, lying farther back, the cells of the spot appear to be mostly larger and round, and much connective tissue lies between them. At the anterior edges of the spot it seems evident that the anterior endothelial layer of the iris has become gradually thickened and grows inward, and that thus the more solid part of the spot has been formed. There seems, therefore, to be no doubt but what the main portion of the

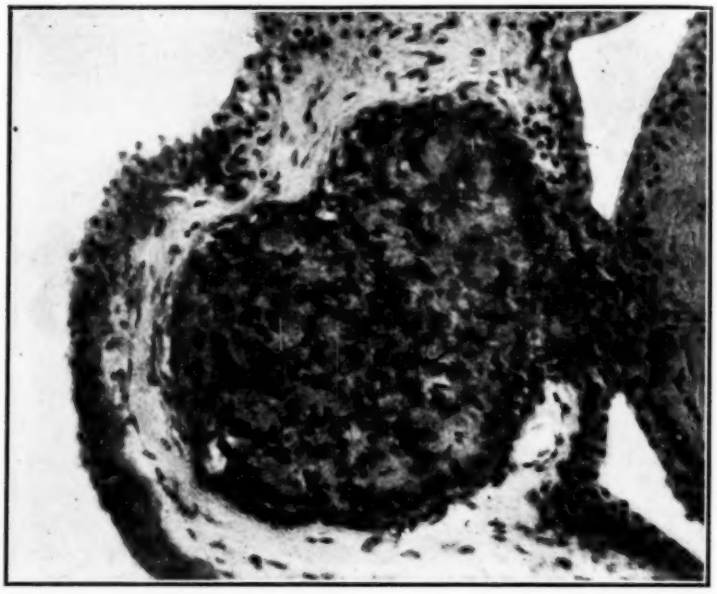

Fig. 8.
The growth shown in Fig. 7 enlarged. Bleached specimen.

melanotic spot is endothelial in nature. In spite of the slight general round cell infiltration this spot shows no special round cell surroundings and lacks the signs of malignancy. There is not even a hyperæmia. It is evidently a true melanoma. (Fig. 1, 2, 3, 4.)

The tissues of the ciliary body and the remnants of the choroid are very much atrophied and altered, but besides the round cell infiltration, they show nothing of particular interest. I have not been able to find any giant cells, but here and there a distinct small focus of round cell infiltration containing a goodly number of plasma cells.

The anterior portion of the ciliary body is the least altered, although inflamed. The ciliary membrane, with the remnants of retinal tissue adherent to it, shows nothing of particular interest.

Another interesting feature, however, in this eye of a man 45 years old, is one of those peculiar small adenoma-like formations in one ciliary process, as have been found and described a number of times by Fuchs, myself and others. This is the ninth time that I have found one. While some authors, like Fuchs, look upon these formations as senile changes, in the case here described we have to deal with a man who can surely not be called senile, although the enormous pathological changes in this eye may, perhaps, have altered its nutrition in such a manner that it may be looked upon as prematurely senile. (Fig. 5, 6, 7, 8.)

The little tumor in general differs in no way from those previously described, except that it shows in several sections a clear central space containing some leucocytes and a substance which takes on a slight eosine stain like dissolved blood, so that by this stain it appears distinct from the amorphous masses lying between the cell rows of the tumor. Perhaps, a hæmorrhage had occurred here, either into the already formed tumor (which is very improbable since it contains no bloodvessels), or, perhaps, a previous local hæmorrhage may in these cases have something to do with the formation of such a tumor.

As this eye had undoubtedly been the cause of the sympathetic irritation of the fellow eye, its pathological condition was especially interesting. The bone formation was undoubtedly of long standing and had not caused any sympathetic affection in all these years. Aside from all the changes in the intraocular tissues which culminated in this bone formation, these tissues now show numerous focuses of round cell infiltration which in their very arrangement seem to point at once to a microbic irritant. They are at any rate of recent date and, therefore, in the sense of Fuchs' researches, probably the ultimate cause of the sympathetic affection of the other eye. I was unsuccessful in my trials to find some micro-organisms. This eye had at no time in its life history suffered an injury or a perforation of its outer walls. It seems, therefore, that all of its pathological changes have been caused by some endogenous infection, but more especially the recent invasion of the quiet, though very much altered, tissues of the uveal tract. The conditions found are such as to support Fuchs' opinions concerning the origin of sympathetic disease.

A CLINICAL CONTRIBUTION TO THE QUESTION OF A PERMANENTLY FREE COMMUNICATION BETWEEN THE ANTERIOR AND POSTERIOR CHAMBERS.*

By Dr. G. Winselmann,
Bremerhaven.
(translated by adolf alt, m.d.)

In 1898, C. Hamburger made the statement, and proved it, by experiment, that in the normal condition a permanently free communication does not exist between the anterior and posterior chambers; that on the contrary, as a physiological fact, the pupillary margin shuts off the fluids. With this statement he wanted to prove Leber's theory untenable, according to which the aqueous humor is produced solely by the ciliary processes, while the anterior surface of the iris is in no way concerned in the secretion of the aqueous humor.

"Since, as is generally accepted, a continuous and absolutely constant exit of fluid takes place in Fontana's spaces, that is in the periphery of the anterior chamber, so that the contents of that chamber are changed in about every 30 minutes, there must be, also, a never-ending current for the supply of this fluid. If it is possible to prove that the pupil is not, or not at all times, permeable for fluids, the anterior chamber forms, so to speak, a basin which is shut off posteriorly and it must receive its supply of fluid from another source."[1]

The results of his very elegant experiments, which I had personally a chance to see during a demonstration before the Berlin Ophthalmological Society, were the following: When minimal quantities of fluorescein are brought into the posterior chamber of a rabbit's eye—the technique of these experiments may be found in Hamburger's original paper[1]—no color passes into the anterior chamber for 15, in many experiments even for 30 minutes; this, however, occurs at once when the anterior chamber is punctured, when according to Ehrlich the contents of the posterior chamber empty into the anterior one. This experiment is the most successful under eserine miosis; with a wide pupil it sometimes fails. The color, also, passes forward when the animal is taken into the dark and its pupil is suddenly widely dilated.

*Klin. Monatsbl. fuer Augenhlk., August, 1909.

The exceptions made by Levinsohn concerning the arrangement of Hamburger's experiments and conclusions drawn therefrom did not hold good and were soon refuted by Hamburger,[2,3,4,5,6] while Leber, for whose opinion Levinsohn's experiments seemed to plead, did not notice them.

On the contrary, Leber[8] recognized Hamburger's experiments as correct, but opposed the conclusions drawn from them.

In a further exhaustive paper[9] Hamburger reported the continuations of his experiments and defended his opinions against Leber's.

"The existence of a physiological pupillary seclusion cannot be doubted:

"1. Because in an albinotic rabbit the light green color is seen to expand behind the rose colored iris without at first passing over into the anterior chamber;

"2. Because, even the physiological play of the pupil caused by continued illumination and covering in sunlight for from 5 to 15 minutes does not cause the color to pass forward from the posterior chamber, while a forward movement in circular form takes place immediately when the cornea is punctured or the pupil dilated by instillations of cocaine;

"3. Because when fluorescein is injected into a vein the color appears in as soon as one or two minutes in the anterior chamber in shape of the so-called Ehrlich's line, while when brought direct into the posterior chamber it may be retained there for about half an hour, even when the pupil is wide; with other words, the firmly closed bloodvessel wall is easier permeated by the color, than Leber's assumed open spaces between iris and lens—which do not exist.

"The physiological seclusion of the pupil is not hermetical, but valve like, and is often broken, very probably when the pupil is dilated *ad maximum,* certainly during inflammations of the iris and ciliary body, perhaps, also, during every more forceful hyperæmia of the eye. It holds out, however, always when the pupil is medium wide or contracted; that is, in well lighted spaces, during continued accommodative near work, after eserine instillation, in newly born children, and especially during sleep.

"Therefore, in the norm it is the function of the ciliary body to furnish the fluids for the tissue lying behind the iris, but the aqueous under physiological condition, or certainly its larger quantity, does not come from the ciliary body, but from the anterior surface of the iris."

Based on continued experiments Hamburger in 1902 before the Heidelberg Congress[12] was in a position to assert his opinions with certainty. Here he likened the ciliary body to the lacrimal gland. As the physiological tearfluid in its largest portion is not furnished by the lacrimal gland, but by the conjunctiva, unless by some special irritation this gland is stimulated to the secretion of larger quantities of fluid, thus the iris fills the ordinary very small demand of aqueous humor; when, however, for some reason the metabolism becomes more vivid, the ciliary body, too, secretes aqueous humor and then more than the iris, just as in weeping more tears are secreted by the lacrimal gland than by the conjunctiva.

Reinstein[11] in a dissertation supported Hamburger's views and experiments by his own made in the Halle ophthalmic clinic under Schmidt-Rimpler's supervision.

"Of 34 experiments on rabbits 18 were positive, the color injected into the posterior chamber remaining there for a time, from 10 to 19 minutes, and passing after this time only, either voluntary or with artificial help forward into the anterior chamber. Why did the color remain so long in the posterior chamber? Clearly, because it could not pass out, retained by the iris which lies upon the lens. When a mydriatic is used the color passes forward at the moment when the portion at which iris and lens touch each other is no longer sufficiently large to maintain the seclusion of the two chambers, a moment in which the pupillary sphincter has no longer the power to keep up such a seclusion between the anterior and posterior chambers."

"When during Hamburger's experiments the color passed over sometimes after considerable time without an artificial relaxation of the sphincter, this may have been caused by the fact that following the irritation of the puncture for the injection, or to the color itself an increased secretion took place into the posterior chamber. While this point is still not fully explained, one thing is certain that the physiological seclusion of the pupil is proven by the resistence of the sphincter during the injection and for sometime afterwards."

In spite of this Leber[14] in his last publication remains on his former standpoint, and denies that Hamburger's experiments have any value in the proof of the question under consideration. The main arguments which he brings forth against Hamburger are the following:

"It is true that in perfect seclusion of the pupil, even after a prolonged time, still some fluid usually remains in the anterior

chamber, which it was thought was due to a secretion from the anterior surface of the iris. But the exit of the aqueous humor must cease before the anterior chamber is perfectly empty, because through the pressing forward of the iris the so-called filtration angle at the periphery of the anterior chamber is shut off, so that the amount of fluid found within it, is no proof of a secretion from the anterior surface of the iris. It has, also, been stated that the pressing forward of the iris and the increase in tension do not, as a rule, appear at once, but only gradually and sometimes after a prolonged time only. This is, however, easily explained by the fact that the seclusion of the pupil is frequently but apparently complete, etc."

This may be correct; that, however, it is not always so, is proven by Stock's[16] case, who could observe an absolutely impermeable agglutination between iris and lens, and yet, with it an anterior chamber of normal depth and no glaucoma.

Some of the experiments on which Leber bases his views are accompanied by such traumatisms to the eyes experimented on that it is hardly possible to draw conclusions from them as to normal conditions.

Leber's conclusion, too, that only the ciliary body and not the iris, also, secretes the aqueous humor, because after removal of the iris the anterior chamber remains normal, however, after removal of ciliary body and iris every production of fluid in the eye ceases, can, as Hamburger has[15] previously maintained, to say the least, be considered doubtful.

An accidental observation which I have recently made and which, as far as I have been able to see the literature, has not previously been made public, seems to me to be favorable for the determination of this question.

On April 30th of this year a laborer came to consult me whose eye had been struck by a piece of iron about 1 ccm. in size, 5 hours previously. Aside from a slight swelling and sugillation of the upper lid and some excoriation of the skin, at first nothing could be seen externally on the injured eye. The pupil was as large as the left one and reacted well, the aqueous humor was perfectly clear. V. was less than 5/60, with —1. D. 5/20. Left eye V.=5/5. After staining with fluorescein a defect in the corneal epithelium was found nasally and upwards.

With the ophthalmoscope I could obtain a red reflex only temporally, the center and nasal half of the pupil remained dark. In order to examine the fundus more thoroughly I instilled a drop

of a 1 per cent. solution of eumydrine and then observed the eye unceasingly. After 10 minutes I saw that the pupil began to dilate on the upper nasal side. At the same moment a little drop of bloody fluid came forward at the upper nasal pupillary margin and forming a red streak fell gradually to the bottom of the anterior chamber; soon a second and a third such red streak appeared by the side of the first one, and after a few minutes they formed a small hyphæma. About 5 minutes later the pupil dilated, also, in other parts and soon the whole aqueous humor was tinged with blood. A quarter of an hour later this had cleared up somewhat and the hyphæma filled about the lower third of the anterior chamber.

This observation at once reminded me of Hamburger's experiments.

The blunt traumatism from which the patient had suffered 5 hours previously caused a hæmorrhage into the vitreous body and posterior chamber. The blood was retained in the posterior chamber without causing even the faintest trace of a stain in the aqueous humor. But, at the very moment when the action of the mydriatic began, the blood passed forward from the posterior into the anterior chamber at the place where this action first set in.

The interocular hæmorrhage had existed previously, as was shown by the ophthalmoscopic examinations made before the eumydrine was instilled. Moreover, it would be in the highest degree improbable that at the very moment when the mydriasis began, 5 hours after the injury, a hæmorrhage should have taken place. It is equally improbable that blood had passed into the anterior chamber earlier and had disappeared, because a hyphæma does not usually become absorbed in five hours.

Therefore, there remains only one—and in my opinion the only—explanation—that the anterior chamber was so well secluded from the posterior one, that no blood could pass through.

Of course the passing over of red blood corpuscles is not absolutely identical with that of a free solution, as is used in the injection of fluorescein.

Nevertheless, this observation is likely to support Hamburger's contention, since, if there was a free communication, blood corpuscles must necessarily have found their way into the anterior chamber.

LITERATURE.

1. C. Hamburger.—Besteht freie Communication zwischen vord. u. hint. Augenkammer? Zentralbl. f. pr. Augenhlk., 1878. p. 225.
2. Levinsohn.—Ueber freie Communication zw. Hinter—u. Vorderk. des Auges. Physiol. Gesellsch., Berlin, 1898 u. 1899.
3. Levinsohn.—Zur. Frage der staendigen Communication zw. vord. u. hint. Kammer. Kl. Monatsbl. f. Augenhlk., 1899, p. 52.
4. C. Hamburger.—Erwiderung auf vorstehende Arbeit. Ibidem, p. 144.
5. Levinsohn.—Kurze Bemerkung z. vorst. Erwiderung. Ibidem, p. 226.
6. C. Hamburger.—Notiz. z. vorst. Bemerkung. Ibidem, p. 227.
7. C. Hamburger.—Weitere Beabachtungen über d. physiol. Pupillenabschluss. Dtsche. Med. Wochenschr., 1899, No. 22.
8. Leber.—Ueber d. Ernaehrungsverh. d. Auges. Intern. Oph. Kongress. Utrecht, 1899.
9. C. Hamburger.—Die Quellen des Kammerwassers. Kl. Mtsbl. f. Augenhlk., 1900, p. 801.
10. Levinsohn.—Zu d. Hamburg. Aufsatz: Ueber die Quellen des Kammerwassers. Klin. Mtsbl. f. Augenhlk., 1901, p. 230.
11. C. Hamburger.—Erwiderung darauf. Ibidem, p. 312.
12. C. Hamburger.—Zur Frage woher das Kammerwasser stammt. 30. Vers. Heidelberg Ophth. Gesellsch., p. 246.
13. Reinstein.—Betheiligt sich die vord. Irisflaeche an der Absonderung des Humor Aqueus? Dissert, Halle, 1903.
14. Leber.—Die Zirkulations u. Ernaehrungsverhaeltnisse des Auges. Graefe-Saemisch, 2te Aufl. Vol. II. T. 2, 1903.
15. C. Hamburger.—Bemerkungen zu Leber's Darstellung der Zirkulationsverhaeltnisse des Auges. Kl. Mtsbl. f. Augenhlk., 1905, p. 105.
16. Stock.—Ein Klin. Beitrag zur Frage der Sekretion des Kammerwassers nach Punktion. Ibidem, p. 86.

The older literature on this subject was mentioned by Hamburger[1] and Leber[14].

REVIEW.

MANUAL OF THE DISEASES OF THE EYE FOR STUDENTS AND GENERAL PRACTITIONERS. By Ch. H. May, M.D. 6th Edition, revised. With 362 original illustrations, including 22 plates with 62 colored figures. New York, 1909. W. Wood & Co. Price $2.00.

We congratulate the author of this very practical and complete manual to his success. The book deserves its popularity. Some newly added chapters in this edition enhance its value still more.

ALT.

MEDICAL SOCIETIES.

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Thursday, June 10th, at 8 p.m.
Mr. W. H. Jessop, Vice-President, in the Chair.

[CONTINUED.]

A Case of Retinal Disease with Massive Exudation and Arterio-venous Communication.—Messrs. A. Hill Griffith and A. W. Ormond.

A. J., a female, aged 31, was first seen May 5th, 1906. She had been deaf since she was 9 years old, and the left eye was excised 10 years before by Dr. Hill Griffith. The vision in the right eye was 6/9 with 3D of H.M.

A colored drawing showed the condition of the fundus. The optic disc was indistinct at the inner margin, and the retinal vessels were very distended and tortuous. The upper part of the central retinal vein divided above the disc into a superior nasal and temporal branch, both being very dilated and tortuous; the superior temporal vein could be traced upwards and outwards and ended in a white, waxy looking mass, only the edge of which could be seen. There was one or two small patches of exudate in other places.

The left eyeball, examined pathologically, showed total detachment of the retina.

At the back of the eyeball was a triangular elevation, whose interior was partly filled with calcareous debris; it was surrounded by a fibrous capsule with spaces in it, but no giant cells were seen; a strand of yellow lymph stretched from this triangular elevation to the back of the lens. Lantern slides were exhibited illustrating these points.

A. J.'s sister, aged 15, had lost the sight of the left eye 6 months ago. There was no P.L., and the tension was +3; and an almost total detachment of the retina was seen.

The eye was enucleated, and the choroid at the temporal side of the disc was found to be thickened and engorged with blood.

Embedded in its substance were several plates of young bone, continuous with the fusiform swelling formed by the detachment. The clinical picture was similar to that of the cases described in group 3 of Mr. Coats' recent paper in the R.L.O.H. Reports.

Mr. Ormond suggested that these cases of choroido-retinal exudate might be explained by saying that we are dealing with a general disease of the terminal branches of the retinal vessels.

An Epithelial Filament in the Anterior Chamber Simulating a Thread-worm.—Dr. George Mackay.

A little girl, aged 7, had always enjoyed good health, had no special illness, had never suffered from worms, nor had she complained much about her eye. The vision in the right eye was 6/12, in the left 6/6.

The filament had first been noticed when she was eight months old, and no independent movement had ever been detected in it, but the parents were under the impression that it was slowly increasing in size. There was occasional irritability and a trace of ciliary injection. At the periphery of the iris, close to the angle of the anterior chamber, between the 5 and 6 o'clock meridians, a buffy grey filament about 1 mm. in diameter, emerged from between the fibres of the iris, ascended in close relation with the posterior aspect of the cornea for 3 or 4 mm., then bent backwards towards the lower border of the pupil, and crossing the vertical meridian of the anterior chamber, appeared to rest lightly in contact with the sphincter surface of the iris. Thereafter it bent downwards once more, following the plane of the iris nearly in the 7 o'clock meridian. The structure terminated in a slightly bulbous free extremity which did not re-enter the iris nor extend to the angle of the anterior chamber. The arched filament had thus a slight spiral twist.

The filament was removed and subjected to pathological examination, when it was found that the structure was mainly composed of stratified epithelium with a little loose connective tissue.

Mr. Parsons thought that the filament might be of endothelial origin.

The Report of the International Committee on the Unification of the Notation of Visual Acuity and the Meridians of Astigmatism.—Mr. W. H. H. Jessop.

The conclusions arrived at were as follows: (1) The meridians of astigmatism should be measured and represented as the ob-

server looked at the patient; (2) the axes should be measured and represented in the upper semi-circle of the trial frame. The numbering of the axes should start from the middle line of the face in each eye, and proceed upwards and temporalwards. The zero would therefore lie at the nasal end of the semi-circle and 180° at the temporal. The committee also agreed that, for international test types, numbers should be used. Landolt's ring was also thought to be a suitable object. The unit of measure should be an angle of 1 minute; the types were to be constructed as regards size in arithmetical progression, and the standard distance at which they were to be seen should be 5 metres. The source of light should diffuse daylight, arranged if possible opposite the types and not laterally.

MALCOLM L. HEPBURN.

Friday, July 9th, 1909.

In the absence of the President, Mr. Marcus Gunn, Mr. Priestley Smith took the chair.

CARD SPECIMENS.

Dr. W. W. Edridge-Green showed a new Spectroscope for Testing Color Vision. This instrument was a great advance on the spectroscope he had shown for the estimation of color vision at an earlier meeting of the Society. It was constructed, and the adjustments of the instrument were so graduated, that readings could be taken direct from the instrument without the necessity for using calculation tables. In the focus of the instrument are two movable shutters, either of which is capable of moving across the spectrum. By means of the two shutters any given portion of the spectrum can be isolated. Each shutter is controlled by a drum graduated in wave lengths, so that the position of the edges of the shutters can be shown. The accuracy of the graduation is to 5 Angstrom units. With this instrument it is possible to ascertain the exact size of portions of the spectrum which appear monochromatic and their varying size with different persons. It is also possible to determine the limits of variability on both sides of the spectrum, the exact size and position of the neutral band in different dichromics and the position of the most luminous portion of the spectrum.

Mr. N. Bishop Harman showed charts of Pedigrees of Three Families with Eye Defects.

1. *Posterior polar cataract.*—The lens defect took the form of a mass of opacity in the posterior layers of the lens proper; it was supposed that a hyaloid artery persisted. In one case the opacity extended to the nucleus, and in another projected from the front of the lens through the pupillary opening, so forming a true "axial cataract." In the first generation no defect could be discovered from the available evidence. In the second generation two were affected. Both married and had affected children; the elder had three children blind in five, the younger all three children blind. Of this third generation one had married (to a woman who had previously borne a normal child to another man), eight children were born, two were blind and four had minor eye defects. All were dwarfed both in stature and in mind.

2. *Anterior polar cataract and microphthalmus.*—The globes were very small, corneæ measuring 7 mm., with marked squint, nystagmus, and minimal vision. In the first generation a woman (the condition of her eyes is not traceable) married twice, and it is interesting to find that in each childship she had an affected child. One of these affected children married a woman from a normal family, of their eight children two are blind. Two of one childship—one affected and one not affected—died insane.

3. *Lamellar cataract.*—A boy of 14 was found to have bilateral cataract, slight in one eye, marked in the other. His teeth were honey-combed in the extreme. The boy's father had identical defects and both had suffered severely from fits in the first year of life. Investigation of the connections of the family showed that no lens defects had appeared in any member in any branch; only it was found that the man's children had feeble vitality, for of five only one survived the second year.

Mr. Harman thought that a germ-plasm transmission of defect could not certainly be held to explain such a likeness in father and son, similarity in conditions of life might be sufficient, but the point could only be decided if and when the boy had progeny. Of the other two histories there could be no doubt that the transmission of a germ-plasm defect was responsible for the inheritance of the eye conditions.

PAPER.

Messrs. A. Lawson and Mackenzie Davidson read:

"A Preliminary Note on the Treatment of Eye Disease by Radium." The cases chosen for treatment by this means had been selected on account of their well-known character for intractability or virulence. Seventeen cases had been under treatment:

10 were corneal ulceration, 3 were hypopyon, 4 were non-ulcerative keratitis, 2 of episcleritis, and one of relapsing vesicular keratitis. The results obtained were distinctly encouraging. In the treatment of these cases with radium they were careful to eliminate complication in determining the effective curative agent, so no other treatment was used at the time save a simple boric lotion, and atropine in ointment to dilate the pupil.

Method of administration. The radium was contained in sealed glass tubes. The eye was well cocained and the blunt extremity of the tube was placed in direct contact with the diseased part, and moved over the area if large. The exposure was from three to five minutes, and on from one to four occasions. The dose, or amount of radium exhibited varied considerably, for they had in view the determination of what results could be obtained from variable quantities. So little as 5 milligrammes were used in some cases, and as much as 49 milligrammes in others. The glass capsule of the tube acted as a screen preventing the action of the alpha-rays, but the beta- and gamma-rays were permitted to pass to the tissues. So far they had not been able to correlate dose and effect, nor the time and frequency of exposure with the effect obtained. The application caused a very little pain, described as "numbing" and "throbbing," it rarely lasted more than a few hours, but in one case it continued for three to four days, and in another for twenty hours. In one case they observed retinal irritation following exposure, and in a case of trachomatous pannus the exposure caused considerable pain and increase of vascularity.

So far they had not tried the effects of radium on old scars of the cornea, but upon skin scars, particularly keloid, its effect was truly remarkable. They could not say it had any selective action on tubercular keratitis, tubercular lesions of the skin were little if at all affected by it, in great contrast to its curative action on epitheliomata and rodent ulcers.

Presentation of the Nettleship Medal.

Mr. Priestly Smith said he regretted exceedingly that Mr. Marcus Gunn was not present to do the special honors of the occasion. It was one that was unique for the Society; the medal was founded in honor of the man whose image and superscription it bore, and the Selection Committee of the year had found that there was no one whose work had done so much to further their enterprise as Mr. Nettleship, to whom he handed the medal.

N. B. H.

CORRESPONDENCE.

Editor American Journal of Ophthalmology.

DEAR DOCTOR:—A meeting of physicians and surgeons interested in Scientific Clinical Research is called for Wednesday, October 27, 1909, at John Ware Hall, Boston Medical Library, No. 8 Fenway, Boston, Massachusetts. The meeting will come to order at 10 A.M., and carry its sessions through Wednesday, and, if necessary, through Thursday and Friday.

The object of the meeting is: First, to establish an American Association of Clinical Research; secondly, to establish clinical research on an incontrovertible scientific basis in hospitals; and thirdly, to institute an American Journal of Clinical Research, in which the work of members of the American Association and of others doing clinical research work in a scientific manner shall be published.

You and your friends are herewith cordially invited to participate in this meeting and in the proposed movement of scientific clinical research.

This invitation is extended to all physicians and surgeons whose interest goes beyond the immediate case work of ordinary clinical societies; and it is hoped that the invitation will be accepted by all medical practitioners, irrespective of their present medical affiliations, who can appreciate the necessity for establishing on an incontrovertible scientific basis the certainties and limitations of the present practice of medicine and surgery before attempting to add to the already large and cumbersome field of medicine.

The American Association of Clinical Research is not intended to disturb the present medical affiliations of its members nor to interfere in the very least with the duties they owe and the privileges they enjoy by virtue of their affiliation with any existing national medical body.

The American Association of Clinical Research is to take cognizance of the fact that the clinic requires cold facts and conclusive methods, and upon these fundamental requirements, the structure and the work of the American Association of Clinical Research are to be built.

It is of the utmost scientific importance to establish conclusively all that is at present true in medicine and surgery, and

only upon such proved knowledge, to base any further advancement. The clinic deals with clinical entities and not, like the laboratories, with parts as entities. Therefore, clinical research differs, and must differ, from experimental laboratory researches. Clinical research must consider clinical entities, and when considering parts, it must consider them only as parts and not as wholes. All that subserves the object of obtaining and investigating clinical facts and principles belongs to clinical research and the laboratory is a part of the means of clinical research, but only a part.

The crux of the matter appears to be that experimental laboratory proof is not sufficient clinical proof. In order to advance in an irresistible line, clinical research must be based on a conclusive form or method of clinical proof. In experimental proof, we dislocate a part from a whole and attempt to prove the whole from the part, as though a dislocated part could always prove the whole. Or, we attempt to prove facts in one species by facts in another species, as though the two species were identical. For instance, the experiments made on animals to elucidate certain elements of fever bring out a fact of almost insurmountable difference between man and the lower animals, the fact that man has associated with the nakedness of his body a highly perfected power for regulating his temperature, a highly developed vasomotor system and a vast array of sweat glands, a characteristic complex of things which apparently no other species of animal life presents. Experiments made on animals to prove febrile or other clinical phenomena in man, may be suggestive, but for obvious reasons cannot be conclusive. To prove observations in man, the observations must be made on man and not on animals. But observations on man even are not necessarily conclusive. Individual observations on man cannot be conclusive, because the same experience cannot be repeated, and when we prove by numbers, we compare similar but not identical experiences. Analogy is not conclusive proof. Identity alone is conclusive proof; but since, in medicine, identical experiences cannot be repeated, we must provide simultaneous identical experiences in order to have proof of identity. Clinical proof is conclusively established when all observations and experiments are made conjointly by at least two competent men, preferably of opposite ideas, at the same time. Conjoined critical observation and experiment, at the bedside and in the laboratory, as may be required, furnish simultaneous identical experiences, the proof pro-

ceeding on the principle that a whole can be proved only by the whole and not by dislocated parts.

These and other weighty questions await your assistance for a necessary solution. The benefit that will accrue, both to medicine in particular and to the medical profession and humanity at large in general, from a satisfactory establishment of scientific clinical research, can be easily surmised. Come prepared, yourself and your friends, to give to this matter your mature convictions and your personal assistance. Only from a critical interchange of critically acquired opinions, can we hope for clearness and for the clarification of the medical atmosphere now charged with confusion and indifference.

Your communication, indicating your interest and your expectation of being present at the meeting in Boston on October 27, next, is eagerly awaited, and on receipt of the expression of your interest, further developments will be communicated to you personally in due time.

Please address your communications at the earliest possible date directly to James Krauss, M.D., 419 Boylston Street, Boston, Massachusetts.

Yours fraternally,

JAMES KRAUSS, M.D.,

Chairman Committee American Association Clinical Research.
419 Boylston Street, Boston.

August 18, 1909.

ACTION OF ULTRAVIOLET RAYS ON THE EYES.

F. Schanz (*Berliner Klinische Wochenschrift,* May 24, 1909) calls attention to the fact that certain artificial lights which are being extensively used are rich in ultraviolet rays, those in which the luminous body has the higher temperature containing the more. He emphasizes the ocular disturbances these rays may produce. The use of eye glasses made of a certain kind of glass which photographers use to filter the light will shut out the ultraviolet rays and relieve the symptoms produced by them. He recommends the use of this kind of glass in the making of lamp chimneys, electric light bulbs, etc. Fluorescence of the crystalline lens is caused by the ultraviolet rays with long waves.

ABSTRACTS FROM MEDICAL LITERATURE.

By J. F. Shoemaker, M.D.,

St. Louis, Mo.

THE UNRELIABILITY OF THE ASTIGMATIC FAN OR CLOCK DIAL TEST.

David W. Stevenson (*Jour. A. M. A.*, July 3, 1909) believes that the astigmatic fan or clock dial test is unreliable for several reasons. In the first place many patients, because of inexperience or lack of concentration, do not understand what is expected of them and give very erroneous answers. He thinks experience has demonstrated these three points:

1. If there are three lines, the patient may decide by the middle line, or he may notice only the outside lines. If the lines are partly doubled he may fail to refer to the fact. Blackness is often confused with distinctness.

2. The patient often answers according to a view affecting a peripheral part of the lines and not that covering the macula.

3. Often adjacent lines are the lightest and darkest; thus 60 may be the lightest and 90 the darkest, while the patient only mentions the most distinct.

In the second place Stevenson believes that the test is unreliable even if the patients understand thoroughly just what is expected of them and give answers scientifically correct. It is possible to have the lines appear unlike when the patient has no regular astigmatism; and, on the contrary, the lines may appear alike in the principal meridians and yet the patient have some uncorrected astigmatism. The irregular astigmatism, which all patients have to a greater or less degree, may in any case be sufficient to vitiate this test. He says:

The essentials required in careful subjective refraction are a complete trial case including cross cylinders and test letters. The test with these ought to be made in difficult cases with varying illumination and at varying distances. A weak illumination at a short distance may reduce the obscuration by irregular astigmatism, so that the patient may definitely decide what glass gives the most distinct vision. Furthermore, this may require the

faithful use of a reliable cycloplegic, combined with further tests made with enlarged pin-hole discs of two, three and four millimeters diameter. If the patient is told to look exactly through the center of these openings, the shadow of these discs will lie concentric with the macula and therefore practically concentric with the pupil.

THE PROPHYLAXIS OF INTERSTITIAL KERATITIS.

H. Gifford (*Jour. A. M. A.*, July 3, 1909), in summing up his article, offers the following points with reference to the prophylaxis of interstitial keratitis:

First, in the text-books on ophthalmology and syphilis the diagnosis of hereditary syphilis should receive much more attention than it usually does; and, instead of the single faulty cut so commonly used, at least half a dozen figures should be presented, to show not only the Hutchinson incisors, but the other more important forms of syphilitic teeth. Second, all children in public institutions and in private families who show any of the well-marked signs of inherited syphilis should receive a course of antisyphilitic treatment, even if in other respects they seem to be entirely well; the results and indications of this treatment being controlled, if possible, by the serum diagnosis test. Third, where a case of syphilis, inherited or otherwise, appears in a family, all the other members of the family should be examined for signs of the disease, and if such are found, the bearer should be subjected to specific treatment. Fourth, by an extra-vigorous use of specific treatment the disease may be kept out of the second eye in a larger proportion of cases than has hitherto been thought possible.

OPHTHALMOLOGIC QUALIFICATIONS WHICH SHOULD BE DEMANDED OF THE GENERAL PRACTITIONER AND OF THE SPECIALIST, RESPECTIVELY.

Alvin A. Hubbell (*Jour. A. M. A.*, June 26, 1909) believes that the general practitioner should know much more ophthalmology than he does to-day. As the result of his ignorance of this subject many cases of ocular diseases are unrelieved, much suffering is endured and many eyes are lost which could have been prevented had the proper treatment been applied. This is particularly true in the rural districts. The general practitioner's

ignorance concerning refractive errors and muscular imbalance also is favorable to the incompetent optician whose deception and charlatanism result in much harm. Hubbell further believes that the professed ophthalmologist is too often unqualified for the work which he undertakes, he having little more than the preparation afforded by an undergraduate course of study, perhaps supplemented by a few weeks post-graduate course. He deprecates the excessive zeal for specialization which results in the severing of ophthalmology or any other branch from general medicine. The remedy, he believes, is in giving ophthalmology the position in the undergraduate course which it deserves, and that the course and subjects of study which the ophthalmologist shall pursue be regulated by law. He summarizes his views by repeating that the qualifications which should be demanded of the general practitioner are those which would enable him to understand and to treat properly ordinary diseases of the eye, and to examine the eye for refractive errors and to correct its simpler forms. As an assurance of such qualifications, the undergraduate course of study of ophthalmology should be made obligatory, the passing of an examination in it before the medical faculty should be made one of the conditions of graduation, and a subsequent examination in it before the state licensing board, one of the conditions of license to practice.

The qualifications which should be demanded of the specialist are an extended and thorough post-graduate study of every subject essentially bearing on ophthalmology, personal experimental study in the laboratory and personal clinical work in the hospital or in a preceptor's private office. To insure the proper qualifications, legally appointed boards of expert ophthalmologists should examine applicants in such subjects as should be required by law, the result of which should determine whether or not a license should be granted.

ATROPHY OF THE OPTIC NERVE FROM ATOXYL AND ARSACETIN.

Paderstein (*Berliner Klinische Wochenschrift*, May 24, 1909) reports a case of atrophy of the optic nerve, from his own practice, resulting from the use of atoxyl. He epitomizes the details of his case and twelve other cases of visual disturbances from the use of this drug and arsacetin. Of this number only one recovered completely, four became totally blind and the others had marked contraction of the visual field. The toxic element in the drugs is supposed to be the arsenic they contain.

SURGICAL TREATMENT OF OPTIC NEURITIS.

W. O. Nance (*Jour. of Oph. and Oto-Laryn.*, May, 1909), discussing operative measures for the relief of optic neuritis, concludes:

1. Operative procedures for the relief of papilledema in suitable cases offer by far a better prognosis than treatment by drugs.

2. Free opening of the skull and dura, in cases in which the tumor cannot be localized, is the operation of choice.

3. The operation to be of benefit must be performed early before secondary and permanent changes occur in the nerve and other ocular structures. The time when vision begins to fail may be tentatively adopted as the time to operate.

4. Operative measures involving the opening of the skull and dura in papilledema dependent on anemia, toxemia, albuminuria, sinus disease, etc., are contraindicated; hence the necessity of thorough examination of the blood and urine, and an investigation of neighboring cavities, before advising such radical procedures.

5. In cases of tumors implicating the basal tracts, decompression cannot prevent loss of sight.

AMETHYST-TINTED GLASSES.

L. Webster Fox (*Jour. A. M. A.*, July 10, 1909) refers to the fact that since the electric light and other forms of light rich in the ultraviolet rays have come into common use for artificial illumination there has been an increasing number of cases of ophthalmia, varying from simple conjunctivitis to profound ocular disturbances. Until recently the bad effects of intense light upon the eyes was thought to be due to excessive luminosity, but it is now known that the ultraviolet rays are responsible. The retina is protected from the injurious effects of the ultraviolet rays largely by the changes they produce in the crystalline lens which becomes quite fluorescent, as was first demonstrated by Widmark. Fox has found glass which has been changed from white to an amethyst color by the sun in Philadelphia and other parts of the country, but only where it has been exposed to intense sunlight or for a long period of time. He has made the discovery that wearing spectacles made from this amethyst-tinted glass relieves the symptoms caused by exposure of the eyes to light rich in ultraviolet rays. He has graded them 1, 2

and 3 respectively and uses the different grades according to the severity of the symptoms. Concerning the therapeutic indications and results, he says:

The results which I have obtained from amethyst-tinted lenses date back to their employment in the case of dentists afflicted with gold-blindness and cover an experience of over twenty years. In cases of asthenopia the results have been most gratifying. In the case of printers, typewriters, students, seamstresses, and all those who are required to apply the eyes closely under artificial illumination, prompt and permanent relief was afforded, especially when the amethyst-tint was incorporated with correcting lenses. Especially in asthenopia of anemic women the results were most satisfactory; like results were obtained in other cases of ocular fatigue. No. 1 tint is prescribed in all mild forms of asthenopia; No. 2 and 3 in severer forms. As the severe cases become relieved I change to No. 1 color, and these are then worn indefinitely. After wearing even the pale tint the patient does not care to go back to the colorless glass. The glass has been prescribed with great relief to those whose eyes are exposed in X-ray laboratories. In one case a patient of mine who had been almost blind for red, as a result of continually working on that color in a factory, was promptly and permanently relieved by amethyst tint No. 3. On my recommendation many of my friends have prescribed this glass and have met with the same beneficial results.

REFLEX AURAL NEUROSES CAUSED BY EYE-STRAIN.

(With Report of Cases.)

Samuel Theobald (*Jour. A. M. A.*, July 10, 1909) discusses some subjective sensations of hearing caused by eye-strain, chief of which are tinnitus aurium and a "muffled" or "stuffed" sensation in the ear. There may be some pain in or about the ear but this is usually not severe. He thinks it not improbable that vertigo caused by eye-strain may be produced by a reflex derangement in the semi-circular canals. He has observed three distinct types of tinnitus due to eye-strain. (1) The more usual or vascular type; (2) the relatively low-pitched, whining or fluttering sound caused by irregular contractions of the tensor tympani; and (3) the high-pitched, almost musical, intermittent tinkling produced by like contractions of the stapedius muscle. The fact that the sensations mentioned disappear after

the relief of the eyestrain; that the ear affected—for the symptoms were generally unilateral—was usually the one on the side of the more troublesome eye; and that they often became more pronounced when the eyestrain was most annoying, or were brought on, or at least intensified, by use of the eyes, he considers sufficient evidence that the trouble is of ocular origin. The ocular condition causing the trouble was often astigmatism, although in a number of cases it was principally heterophoria. The author has notes of about twenty cases belonging to this class, four of which (well marked cases) he reports. He thinks the explanation of the way in which the symptoms are produced is that they are reflex from the trigeminus.

THE VISUAL FIELDS IN HYSTERIA.

(A Clinical Study of Fifty Cases.)

Walter R. Parker (*Jour. A. M. A.*, July 10, 1909) noting that his experience did not agree with the statement of the majority of writers on the subject of hysteria concerning the frequency of concentrically contracted field of vision in this neurosis, has tabulated his findings in fifty consecutive cases and from these offers the following conclusions:

1. Dyschromatopsia is more common than concentrically contracted fields in the ratio of 72 to 40.

2. There is no relation between the contraction of the visual fields and amblyopia, the former being present in 96 per cent. of the cases, while the latter was found in 8 per cent.

3. There is no constant relation between the areas of anæsthesia and concentrically contracted fields. Of the patients with anæsthesia 28.4 per cent. showed concentrically contracted fields, while 75 per cent. showed dyschromatopsia.

ISOLATED AND COMPLETE PARALYSIS OF THE THIRD NERVE OF TRAUMATIC ORIGIN.

Lee Masten Francis (*Jour. A. M. A.*, July 17, 1909) reports the case of a young woman, with good family and personal history, who, while dressing for a reception, struck her head against a half-open door, the point of impact being the outer angle of the left supra-orbital margin. There was little or no pain, no abrasion of the skin and no immediate symptoms of any severe injury. Within an hour, however, while at the reception, it was discovered that she could not lift the upper lid of the left eye,

which was completely closed. The next day the author found complete ptosis of the upper lid, with the globe turned outward and slightly downward, pupil widely dilated and immobile, and accommodation paralyzed. Further examination showed fundus normal, field of vision normal with no scotomata, no nasal or accessory sinus trouble, no impairment of hearing, and urine normal. There was a complete and isolated paralysis of the third nerve. The faradic current was used for three minutes each day and in two months times the symptoms had all disappeared. In making a diagnosis of the lesion causing the paralysis of the third nerve, hysteria was carefully eliminated. The absence of all other symptoms argued against fracture of the base of the skull and also against the lesion being in the orbit. As there was nothing to suggest lues, the author decided that the lesion was at the sphenoidal fissure and was either a bruising of the nerve or a small subperiosteal hæmorrhage at this point. In support of this diagnosis he quotes, first, Allen Starr (text-book), who says: "Severe falls and blows on the head have been known to cause bruising of the nerve against the sharp edge of the sphenoidal fissure." Second, the conclusions of Dr. Girardot's thesis on this subject as follows:

1. Traumatic paralysis of the motor oculi are rare, especially when one takes into consideration the frequency of palsies of the ocular muscles.

2. The anatomic relations of the motor oculi with the base of the brain are such as to make laceration or compression by bone lesions easy. Indeed, it is not uncommon to see paralysis of the motor oculi associated with those of the facial, or patheticus or abducent and following fractures of the skull, but the isolated paralyses of the third nerve are independent of fractures. They are, probably, due to a hematoma located about the nerve or in its sheath.

3. From the standpoint of the symptomatology there is nothing of special interest, except that they are isolated and complete.

4. Admitting compression by hematoma it does not seem that surgical interference is justifiable, for though the process be a slow one, recovery occurs spontaneously in about two months.

Francis reviews the nine cases of isolated, complete paralysis of the third nerve, reported in literature since 1870.

TENOTOMY OR ADVANCEMENT.

Lucien Howe (*Jour. A. M. A.*, July 17, 1909) divides cases of heterotropia into three classes, each of which has several sub-

divisions. In the first class there is an insufficient action of a certain muscle or set of muscles,—paralysis or paresis of the muscles. In this class it is generally agreed that an advancement should be performed rather than a tenotomy of the opposing muscle or muscles. In the second class there is an opposite condition, viz.: a spasm or excessive action of one muscle or group of muscles. The hypermetrope whose ciliary muscles are always acting excessively sometimes has in connection with this an excessive action of the interni recti, resulting in a convergent squint. Howe thinks most operators agree that in a simple case of this class a tenotomy should be done. The third class contains those cases between these two classes and where both of these conditions exist in the same eye. That is there is an excessive action of one muscle with an insufficient action of its opposing muscle. This condition exists in most cases of long standing and the author emphasises the importance of knowing which cause predominates before deciding which operation is to be done. He gives four sources from which information may be derived in deciding this question. They are:

1. The refraction with the condition of the ciliary muscles.
2. The extent of the arc of rotation and the behavior of the eye, in rotating, as shown by the perimeter or tropometer or both.
3. The exact character of the arc of rotation as shown by photographic tracings.
4. The lifting power of the abductors and adductors as shown by the ophthalmodynamometer.

He discusses these different sources of information and admits that the last two are scarcely practical for the busy practitioner in every day office work, but yet points out that much valuable assistance may be obtained from them in deciding certain difficult cases.

PRACTICAL IMPORTANCE OF HYPERPHORIA—IN PRESCRIBING LENSES FOR USE AT PARTICULAR DISTANCES AND IN DIFFERENT DIRECTIONS.

M. D. Stevenson (*Jour. A. M. A.*, July 17, 1909) believes the subject of hyperphoria deserves more attention than it has been receiving. Normal eyes have vertical equilibrium and even small amounts of hyperphoria usually cause considerable discomfort, as normally it is difficult for more than a 3.5 degree prism base up or down to be overcome. The amount of hyperphoria frequently varies at different examinations and sometimes the first

test may not reveal it. Hence the importance of making frequent and careful tests. Where repeated examinations show .5 degree of hyperphoria constantly present it should be corrected either by prism or by decentering the lens. Hyperphoria of 6 or 7 degrees usually cannot be comfortably corrected with prisms. However, it is the lower rather than the higher amounts that cause great discomfort, as in the higher forms no effort is made to overcome the imbalance.

Stevenson emphasizes especially the importance of testing for hyperphoria at the reading distance and with the eyes in the position as in reading, since there may be hyperphoria in this position when none is present at distance or the amount may vary in the near and the distance. This is particularly true in the cases of partial paralysis of the muscles which raise or lower the eye, and also in cases of anisometropia, where the correcting lenses are worn on account of the greater prismatic effect of the stronger lens. He quotes Duane as having found hyperphoria in 15 per cent. of cases of low anisometropia and in 32 per cent. of high cases, and Bruner as having found this condition in 30 per cent. of cases of anisometropia. He finds it of great advantage to test patients at primary and reading angles without lenses and with them. He also insists on the importance of having patients with anisometropia learn how to hold the head in the position which will best help to overcome the difficulty. Hyperphoria changes frequently, hence the necessity of retesting at intervals, particularly if the patient is not comfortable with the lenses prescribed.

NEUROPATHIC KERATITIS AND SOME ALLIED CONDITIONS, WITH SPECIAL REFERENCE TO TREATMENT.

F. H. Verhoeff (*Jour. A. M. A.*, July 17, 1909) is convinced, from his observations, that diseases of the eye due to disturbance of innervation are much more frequent than is generally supposed and that a wrong diagnosis of these conditions is too often made. What are often reported as unusual cases of keratitis, he believes are really cases of neuropathic keratitis. The only tissues of the eyeball that are affected by such neuropathic conditions, so far as our definite knowledge goes, are the cornea, iris and conjunctiva, and neuropathic keratitis is the only well known condition. Verhoeff uses this term in its broad sense as applying to any lesion of the cornea that is caused by a disturbance of its

nerve supply. He accepts the generally recognized classification of herpes zoster corneæ, keratitis neuroparalytica, herpes febriles corneæ and herpes corneæ neuralgicus, but insists that this should not mean strictly a difference of ætiology, being convinced that neuroparalytic keratitis and the keratitis of herpes zoster are produced in the same way. He thinks that dendritis keratitis, superficial punctate keratitis, keratitis profunda, keratitis disciformus, and traumatic relapsing erosion of the cornea should also be included under the head of neuropathic keratitis. He refers to the views of Fuchs, von Hippel, Peters, Meller and others concerning these conditions and gives his own reasons for including them under that head. In all this class of cases the corneal epithelium is usually changed if not lost or destroyed and it might be thought that infection would often result. While serious infection occurs in only a very small per cent. of the cases, still neuropathic keratitis is so frequent a condition that the author believes it is responsible for a large percentage of all corneal infections aside from those due to gonorrhœal and phlyctenular disease.

Reference is made to the views of Head and Campbell and Wilbrand and Saenger as to the pathology of neuropathic keratitis and Verhoeff offers a theory of his own which he thinks is in harmony with the known facts of the condition. Since it is accepted that some irritation of the fifth nerve or Gasserian ganglion is responsible for the lesion of neuropathic keratitis, and as it is an established physiological fact that when a nerve is stimulated impulses travel along it in both directions, Verhoeff suggests that the efferent impulses produce some change at the nerve end, possibly the production of an acid reaction, and if this were continued long enough sufficient acid or other irritating substance might be produced to cause the corneal lesion. Harmonizing this theory with Fischer's theory that the cause of œdema in general is an increased affinity of the tissue colloids for water, he says: "Thus the irritative lesion, acting on the fifth nerve or Gasserian ganglion, sends impulses to the cornea which produce an acid reaction or other chemical change at the nerve terminals. This in turn acts on the colloids of the corneal lamellæ or epithelium, causing them to become œdematous. The œdema affecting the epithelium from behind produce vesicles, erosions, or less marked changes. To explain the denser and, to a greater or less degree, permanent opacities which occur in cases of long duration, it is only necessary to assume further that proliferative changes take place. These could be produced by the action of

the irritant on the corneal corpuscles leading either directly to proliferation or to necrosis followed by the process of repair." The causes of the irritative lesion may be varied, as trauma, tumors, meningitis, tubercle, syphilis, hæmorrhage, or primary neuritis. Characteristic symptoms which aid in the diagnosis are reduced sensibility of the cornea; the appearance of the corneal lesions, which are better shown after staining with fluorescin; injection of the eyeball which is mostly conjunctival rather than ciliary; slightly reduced intraocular tension; small pupil, unless there is an accompanying paralysis of the third nerve; pain, which while it may be very severe at times and of a neuralgic character, yet often is very slight or absent even when a large part of the cornea is denuded; and the occurrence of herpetic skin eruptions. The treatment the author has found of most value is the instillation of a one per cent. solution of holocain every two hours and the application of a bandage, locally, and internally the administration of arsenic in the form of Fowler's solution. Potassium iodid may be given in cases due to lead poison or to syphilis.

Neuropathic iritis not infrequently accompanies this form of keratitis and also may be associated with herpes zoster ophthalmicus. Verhoeff has seen a number of cases in which neither the keratitis nor herpes zoster were present, but these cases being hard to diagnosticate are not often recognized as the cause is more likely to be assigned to rheumatism. Conjunctivitis is often associated with neuralgia of the fifth nerve and also with neuropathic keratitis. The author describes another form which he has found frequently and which he believes is of neuropathic origin. It is usually classed as a form of "episcleritis" and "manifests itself as a localized area of congestion in the center of which the conjunctiva is swollen into a more or less definite nodule." The palpebral conjunctiva is not involved, although there is usually some general conjunctival hyperemia. This condition is frequently found in connection with neuropathic keratitis or some form of herpes.